Course outcome of under graduate courses department of Ag. chemistry

Course Title : Fundamentals of Soil Science
Code : D-192
Class : B. Sc. Ag I Sem.
Course credit : 2-0-1
Course outcome:

1. Students develop a general understanding about different physico-chemical properties of soils and develop ability to manage them for higher fertility and productivity of soils.
2. Helps students in understanding of different traditional as well as moderns soil defect managing techniques and their scientific relevance.
3. Develops an understanding about essential plants nutrients their metabolic roles in plants their specific deficiency symptoms and strategies to maintain soil fertility for higher and sustained productivity.
4. Helps the students to develop a basic understanding about efficient utilization of naturally occurring inputs such as biofertilizers and organics for higher and sustained farm production and profitability.
5. Familiarise the students in understanding about different soils their origin, specific features, and also generates understanding about the range of crops which can be grown in these soils.
6. Creates practical ability among students for identification of different soil types, rocks and minerals, fertilizers and Agrichemicals.
7. Develops practical ability among students to determine the magnitude of different chemical disorders in the soil (soil pH, salinity etc.)

Course Title : Plant biochemistry and chemistry of plant products
Code : D-296
Class : B. Sc. Ag II Sem.
Course credit : 2-0-1
Course outcome:

1. To understand about synthesis of different biochemical compounds in plant and their significance in plant metabolism.
2. To understand the factors affecting functioning and survival of soil microbes and their specific natural role in governance of natural processes occurring in soils..
3. Helps in developing scientific understanding about commercial utilization of different soil flora and fauna strains to achieve reliance on natural ways of farming.
4. Familiarise about isolation, multiplication and commercial production of microbial strains for their economic use in agricultural production.
5. A practical understanding about physical processes involved and laboratory techniques adopted in study of nature, behaviour and relevance of different soil microbes..

Course Title : Elementary microbiology and soil microbiology
Code : D-397
Class : B. Sc. Ag III Sem.
Course credit : 2-0-1
Course outcome:

1. Would make the student familiar about nature and properties of different biochemical compounds present in plant.
2. Would develop ability among students to understand the factors affecting synthesis and metabolic functions of different biochemical compounds and their significance in plant and human nutrition.
3. Helps in developing scientific understanding about commercial extraction and utilization of different biochemical compounds.
4. Familiarise the students about isolation and determination of content of different biochemical compounds present in plant and plant products.
5. A practical understanding about physical processes involved and laboratory techniques adopted in study of nature, behaviour and relevance of different plant biochemical products.

Course Title : Soil Fertility, fertilizers and INM
Code : D-597
Class : B. Sc. Ag V Sem.
Course credit : 2-0-1
Course outcome:

1. Develops capacity to understand the forces responsible for weathering and soil formation and its significance for maintenance of life forms on the earth planet.
2. Helps the students to learn about basic physico-chemical phenomena/processes governing soil fertility and productivity
3. Familiarise the knowledge regarding soil flora and fauna and their role in maintaining hospitability of soil environment for crop plants.
4. Helpful in developing ability among students in understanding transformation of different nutrient elements and the factors affecting these transformations.
7. Familiarise comprehensive knowledge about essential plants nutrients their metabolic roles in plants, their specific deficiency symptoms and strategies to maintain soil fertility for higher and sustained productivity.
8. Provide insight knowledge about IPNM (Integrated Plant Nutrient Management) and its necessity for sustenance of life and agricultural production system.
9. Helpful in creating practical ability among students regarding diagnosis of soil problems and developing situation specific plan for their reclamation.
10. Provides opportunity to the students to learn different scientific approaches of soil quality enhancement through visit to different research stations of national repute.

11. Creates practical ability for determination of nutrient content in soils and plants and calculation regarding uptake of nutrients.

Course Title : Management of Problem Soils
Code : D-794
Class : B. Sc. Ag VII Sem.
Course credit : 2-0-1
Course outcome:

1. Familiarise knowledge regarding different forms of soil problems their causes of formation and their area and distribution in India and Indian states.
2. Helps the students to learn about basic physico-chemical phenomena/processes governing soil physico-chemical and biological health, fertility and productivity.
3. Familiarise the knowledge regarding soil flora and fauna and their role in maintaining hospitability of soil environment for crop plants.
4. Helpful in developing ability among students in understanding transformation of different nutrient elements and the factors affecting these transformations.
5. Provides opportunity to learn about management of saline, alkaline, acidic, water logged and ravines in reference to economic and sustained crop production.
6. Provides practical knowledge to run glass electrode. pH meter, electrical conductivity meter *etc*. for the diagnosis of soil chemical problems.
7. Helpful in acquiring understanding about use of soil survey equipments for efficient land use and planning.
8. Creates ability to decide the kind and quantity of soil reclamants for the given set of agroclimatic situations and crops.
9. Creates practical ability to judge the quality of irrigation water and the strategies for the use of poor quality irrigation water.
10. Provides on farm practical ability to diagnose the soil sickness and problems through visible field appearances.

Course Title : Rural Agricultural Works Experience in Soil Science and Ag. Chemistry
Code : D-891(d)
Class : B. Sc. Ag VIII Sem.
Course credit : 0-0-2
Course outcome

1. The course provides an opportunity to the students to understanding the rural society in perspective of agriculture and allied activities.
2. Makes the students familiar with socio economic condition and functioning of farmers and its community.
3. Helps the students to impart the practical knowledge of different soil reclamation operations performed by different farmers.

4. Provides opportunity for the field visit to understand the farmer problems related to declining and gradual loss in soil fertility in reference to crop production and develop strategies for their improvement.
5. Develops confidence and competence among the students in solving agricultural problems.
6. Helps the students for generating on site ability for INM feasibilities at farm under different situations.

Course Title : Geo informatics and Nano-technology
Class: B. Sc. Ag V Sem. Code : AG-511
Course credit: 1-0-1

Course outcome

1. Familiarise knowledge regarding different techniques, tools and practices used in precision agriculture.
2. Helps the students to learn about basic principles of spatial data management in GIS for its agricultural uses.
3. Familiarise the knowledge and techniques adopted in image processing and interpretation in Global Positioning Systems (GPS).
4. Provides opportunity to learn about nano-technology its concepts and techniques of nano-practices and nano scales in agricultural studies.
5. Creates ability to design the nano-particles, nano-pesticides nano-fertilizers, nano-sensors etc use full in commercialization of agriculture.

Department of Agricultural Economics

RK (PG) College, Shamli-247776

Course Outcome (NEP)

1. Fundamentals of Agricultural Economics (AG-204) (2+0)

At the end of the semester the students will:

CO 1: Learn about the basics of agricultural economics.

CO 2: Get acquainted about the concept of demand and supply.

CO 3: Learn about various National Income and taxation measures.

CO 4: Gain knowledge about the status of population, causes and remedies of population explosion.

2. Agricultural Finance and Co-operation (AG-305) (2+1)

At the end of the semester the students will:

CO 1: Understand about the recent developments in agricultural credit.

CO 2: Learn about micro financing including Kisan Credit Card.

CO 3: Learn how to prepare balance sheet and income statement of the farm.

CO 4: Know about the process of loan appraisal and regarding the techno economic parameters to be considered for preparation of projects.

3. Agricultural Marketing, Trade and Prices (AG-504) (2+1)

At the end of the semester the students will:

CO 1: Have a thorough understanding about agricultural marketing, market structure, marketing mix and market structure.

CO 2: Understand price behaviour over time for some selected commodities.

CO 3: Gain knowledge about various public sector institutions in marketing such as CWC, SWC, FCI, CACP and DMI.

CO 4: Get acquainted about the principle of comparative advantage on international trade.

4. Farm management, production and resource economics (AG-604) (1+1)

At the end of the semester the students will:

CO 1: Learn how to prepare farm layout and determine the cost of fencing of a farm.

CO 2: Understand how various production functions are used to take decisions on a farm, factor-factor, factor-product, product-product relationship.

CO 3: Get knowledge about various crop, livestock and machinery insurance and how they can get compensated for the loss.

CO 4: Know about the negative externalities in agriculture.

5. Agri-business Management AGE-51 (2+1)

At the end of the semester the students will:

CO 1: Learn how to prepare projects and feasibility reports for any agribusiness enterprise.

CO 2: Know about various financing institutions such as cooperative societies, commercial banks, RRBs, NABARD.

CO 3: Gain knowledge about agri-input and output markets.

CO 4: Learn to apply various appraisal/ evaluation techniques for identifying viable projects.

6. Rural Agricultural Work Experience (RAWE) and Agro-industrial Attachment (AIA) subject related work

At the end of the semester the students will:

CO 1: Get practical experience of the field.

CO 2: Get opportunity to have a close observation of the farmers working in the field.

CO 3: Get attached to various agro-industries and learn about their functioning.

Course Outcome (Old Course)

1. Elementary Agricultural Economics, Agricultural Marketing and Cooperation

At the end of the semester the students will:

CO 1: Be able to apply the principles of economics into the field of agriculture, study of consumers' and producers' behaviour and different forms of market structures.

CO 2: Get acquainted with various problems which the farmers face in the marketing of their farm produce and the intervention of government to solve those problems.

CO 3: Get acquainted about the concept of demand and supply.

CO 4: Understand price behaviour over time for some selected commodities.

2. Natural Resource Economics and Farm Management Economics

At the end of the semester the students will:

CO 1: Learn how to prepare farm layout and determine the cost of fencing of a farm.

CO 2: Understand how various production functions are used to take decisions on a farm, factor-factor, factor-product, product-product relationship.

CO 3: Get knowledge about various crop, livestock and machinery insurance and how they can get compensated for the loss.

CO 4: Know about the negative externalities in agriculture.

3. Agricultural Finance, Business Management and Trade

At the end of the semester the students will:

Co 1: get acquaint students with the importance of farm credit, its acquisition and use in agriculture and to impart the knowledge of the organization, operation and functioning of various farm lending institutions among the students.

CO 2: Learn about micro financing including Kisan Credit Card.

CO 3: Learn how to prepare balance sheet and income statement of the farm.

CO 4: Know about the process of loan appraisal and regarding the techno economic parameters to be considered for preparation of projects.

4. Rural Agricultural Works Experience

At the end of the semester the students will:

CO 1: Get practical experience of the field.

CO 2: Get opportunity to have a close observation of the farmers working in the field.

CO 3: Get attached to various agro-industries and learn about their functioning.

Department of Agricultural Engineering

RK[PG] College, Shamli -247776

Course Outcome

1. **Farm Machinery and Power [AG-306]**

The syllabus of this course has been designed to acquaint the students with existing status of farm power and machinery in India, recent developments in it, functioning of I.C. Engines and its different .structures. This course enables the students to familiarize with primary and secondary implements for hill agriculture and other implements of agricultural use. Ultimately students get the ability to develop and operate farm machineries and other implements specific to agricultural use.

2. **Renewable Energy and Green Technology [AG-406]**

Energy has been an important component to meet day to day need of human beings. The degree of civilization is measured by the energy utilization for human advancements or needs. Energy sources which are continuously and freely produced In the nature and are not exhaustible are known as the renewable sources of energy. E.g: solar energy, biomass and wood energy, geo-thermal energy, wind energy, tidal and ocean energy. These energy sources are that they don't harm the environment through factors such as realizing greenhouse gases into the atmosphere. The importance of hands-on energy – saving activities plays a key role in how students learn about efficiency and can have a positive impact on their thoughts and behaviors around conservation in future.

3. **Protected Cultivation and Secondary Agriculture [AG-505]**

Protected cultivation is a process of growing crops in a controlled environment. It is achieved by providing favorable growth conditions to the plant. Secondary Agriculture is defined as a production activity and devised a strategy that includes sustainability of production, Monetization of farmers produce, Straightening of extension service, and recognizing agriculture as an enterprise.

Open Elective

System Simulation and Agro-Advisory [AGE-64]

Crop simulation models use quantitative description of Eco physiological processes to predict plant growth and development as influenced by environment conditions and crop management, which are specified for the models as input data.

RAWA and AIA

The objectives are to provide an opportunity to the students to understand the rural setting in relation to agriculture and allied activities, to get familiar with socio-economic conditions and problems of the farmers. to impart diagnostic and remedial knowledge, to develop communication skills, to develop confidence and competence to solve agricultural problems.

Department of Agricultural extension

R.K.(PG) College, Shamli-247776

Course Outcome

1.Rural Sociology& Educational Psychology 2(1+1) AG-105

After completing of course students will:

CO1: Understand about sociology and its significance in agriculture extension.

CO2: Learn about social group, stratification ,culture, change and development in social ecology.

CO3: Get knoweledge about Pschology, behavior, personality, intelligence, learning & motivation.

2. Fundamental of Agricultural extension education 3(2+1) AG-208

After completing of course students will:

CO1: Perceive the importance of extension education in respect to technology of transfer (TOT) among the farmers.

CO2: Know the major rural development programmes before independence and after independence.

CO3: Aware about the ongoing programmes under different ministries of Govt. Of India and extension agency like ATMA, KVK etc.

CO4: Prepare audio visual aids to provide informal or formal information among the farmer.

3. Enter Preneurship Development and Business communication 2(1+1) AG-408

After completing of course students will:

CO1: Learn about entrepreneur, Entrepreneurship Development and characteristics of entrepreneurs.

CO2: Develop their managerial skill, business leadership quality and capacity building.

CO3: Prepare the agri-entrepreneurship bussiness plan to improve the live and livelihood of the rural people.

4. Communication skills and personality development 2(1+1) AG-508

After completing of course students will:

CO:1 Learn about communication meaning, definition, process, principles and models.

CO:2 Understand about footnotes, bibliographic procedure and indexing etc.

CO:3 Know about the diffusion and adoption of innovation.

5. Rural Agricultural Work Experiences (RAWE) and Agro- industrial Attachment(AIA) subject related work

After completing of course students will:

CO:1Understand about practical knowledge of the field.

CO:2 Get opportunity to have a close observation of various agro-industries and their function.

COURSES OUTCOMES- DEPARTMENT OF AGRONOMY

The department of Agronomy is a post graduate department. Following under graduate and post graduate courses are being taught in the department;

LIST OF UNDER GRADUATE COURSES

Name of semester	Sl. No.	Course title	Course code	Course credit hours
B. Sc. Ag I Semester	**1**	**Principles of Agronomy**	**D-191**	**2-0-1**
	2	**Agricultural Meteorology**	**D-195**	**2-0-1**
B. Sc. Ag II Semester	**1**	**Irrigation and Water Management**	**D-291**	**2-0-1**
B. Sc. Ag III Semester	**1**	**Cereals Millets and Pulses Crops**	**D-391**	**2-0-1**
	2	**Environmental Science and Agro-ecology**	**D-394**	**2-0-1**
B. Sc. Ag IV Semester	**1**	**Oil seed, Commercial Crops and Field Crops**	**D-491**	**2-0-1**
	2	**Principle of Soil Physics and Conservation**	**D-493**	**2-0-1**
B. Sc. Ag V Semester	**1**	**Weed Management**	**D-495**	**1-0-1**
B. Sc. Ag VI Semester	**1**	**Farming Systems and Sustainable Agriculture**	**D-694**	**2-0-1**
B. Sc. Ag VII Semester	**1**	**Rainfed Farming**	**D-791**	**2-0-1**
	2	**Agroforestry and Silviculture**	**D-792**	**2-0-1**
B. Sc. Ag VIII Semester	**1**	**Rural Agricultural Works Experience in Soil and Water Conservation**	**D-891 (h)**	**0-0-2**
	2	**Rural Agricultural Works Experience in Crop Production**	**D-891 (i)**	**0-0-2**

Course outcome of under graduate courses department of Agronomy

Course Title : Principles of Agronomy
Code : D-191
Class : B. Sc. Ag I Sem.
Course credit : 2-0-1
Course outcome:

1. Students develop a general understanding about Agriculture and Agronomy and also to relate different branches of Agriculture.
2. Helps students in understanding of different traditional as well as moderns Agronomic techniques and their scientific relevance.
3. Develops an understanding about essential plants nutrients their metabolic roles in plants their specific deficiency symptoms and strategies to maintain soil fertility for higher and sustained productivity.
4. Helps the students to develop a basic understanding about efficient utilization of our scare water resources. So as to maintain its availability as well as usability for our future generation to come.
5. Familiarise the students in understanding role of different climatic, biotic & management factors on the plant growth developments, yield and nutritional quality.
6. Creates practical ability among students for identification of different weeds, manure, fertilizers and Agrichemicals.
7. Computation of input requirements (manures, fertilizers, seeds, weedicide etc) for given areas.
8. Yield and expected profit estimation with the help of post harvest data form large areas.

Course Title : Agricultural Meteorology
Code : D-195
Class : B. Sc. Ag I Sem.
Course credit : 2-0-1
Course outcome:

1. To understand the weather and climate and its components with special reference to Agriculture.
2. To understands the effects of different climate and weather extremes frost. drought, cyclone hailstorm etc on crop production and agri-entrepreneurs.
3. Helps in developing scientific understanding about different weather events and their possibilities of occurrence and intermittent managements strategies to escape from their losses.
4. Familiarise about short term, midterm and long term weather forecast for proper management of agri-entrepreneurs

5. Helps in developing ability among students in deciding climate specific crops and agri-entrepreneurs.
6. Provides an understanding about general layout of meteorological observatory.
7. A practical understanding about physical principals involved in working of different meteorological observatory equipments.
8. Estimation of rainfall and runoff from given area.
9. Helps in developing an "understanding and interpretation about different weather events to come with the help of temperature, relative humidity and wind speed parameters.

Course Title : Irrigation and Water Management
Code : D-291
Class : B. Sc. Ag II Sem.
Course credit : 2-0-1
Course outcome

1. Provides basic idea about water resources of India and Indian states.
2. Helps the students to understand behaviour of water in soil, plant and atmosphere system(SPAC system).
3. Develops skill among students in designing of situation specific irrigation methods and modules.
4. Helpful in developing understanding for answer of three basic questions when to irrigate? how to irrigate? and how much to irrigate.
5. Help full in dissipating understanding about care and maintenance of irrigation resources as a planner and canal distributaries and field channels as an user.
6. To develop understanding regarding causes of poor efficiency of mega and minor irrigation projects.
7. To develop understanding about necessity of drainage for harnessing efficiency of irrigation projects and elimination of several soil problems.
8. Develops practical approach among students for measurement of water content in soil system.
9. Helpful in developing idea about quantity of water needed for a particular crop in a single irrigation as well as during entire crop period
10. Helpful in developing skill among students regarding designing and demonstration of irrigation methods at farm level.
11. Practical idea regarding quantification of discharge and delivery of water from different water sources and calculation of duty of water.

Course Title : Cereals Millets and Pulses Crops.
Code : D-391
Class : B. Sc. Ag III Sem.
Course credit : 2-0-1
Course outcome

1. For developing understanding regarding area , distribution and geography of *Kharif* crops in Indian states and India in particular and ranking of India in world in general.
2. For creating specific awareness among students regarding climatic and edaphic requirements of crops and their cultivars.
3. Helpful in creating ability among students for realising /understanding agronomic and socioeconomic constraints in the production of *Kharif* crops and developing strategies to overcome various crop specific constraints.
4. To familiarize students regarding scientific production techniques of *Kharif* crops for achieve higher quantity and quality of produce.
5. Helps the students in providing comprehensive knowledge regarding diagnosis /identification of crop disease, harmful insect pests and weeds and developing appropriate management strategies.
6. Practical awareness about weeds found in different *Kharif* crops.
7. Familiarize the students about the field symptoms of disease of *Kharif* crops.
8. To develop practical approach in identification of harmful *Kharif* crops insect pests.
9. Helps in developing ability among students about calculation of seed, weedicide, insecticide, requirement for given areas.
10. Helps in developing ability for macro crops related survey regarding area, production, productivity with the help of post harvest data.

Course Title : Environmental Science and Agroecology
Code : D-394
Class : B. Sc. Ag III Sem.
Course credit : 2-0-1
Course outcome

1. To gain in-depth knowledge among students on natural processes involved in our environment that sustain life and economy.
2. To develop an understanding about consequences of faulty human activities on the environment and web of life, economy and quality of human life.
3. To familiarize the students about succession and adoption of different crop species under different agro ecological situations.
4. Helps in acquiring values and attitude towards understanding environmental socioeconomic changes and participation actively in solving environmental problems for the benefit of our as well as future generations to come.

5. To make the students capable to understand situation specific crop production related environmental issues and to develop core strategies.
6. Practical understanding about different ecosystems and their components.
7. Familiarise the students about lithospheric and water pollution in particular and creates ability for appropriate means to handle the problem.
8. Help the students in developing techniques about studying succession of weed, and crop species in different agro environmental situations.
9. Helps in developing soil and water pollution controlling modules at farm as well as at community level.
10. Develops ability in the quantification of pollutants presence in the system.

Course Title : Oil Seed and Commercial Crops (*Rabi* Crops)
Code : D-491
Class : B. Sc. Ag IV Sem.
Course credit : 2-0-1
Course outcome

1. For developing comprehensive understanding regarding area distribution and geography of *Rabi* crops among Indian states and India in particular and world in general.
2. For creating specific awareness among students about climatic and edaphic requirements of *Rabi* crops and their cultivars.
3. Helpful in creating ability to understand different agronomic and socioeconomic constraints in the production of different *Rabi* crops and developing core strategies to overcome various crop specific problems.
4. To familiarize the students regarding scientific production techniques of *Rabi* crops for achieving higher quantity and quality of produce.
5. Help the students in gaining comprehensive knowledge regarding diagnosis/identification of *Rabi* crop diseases harmful insects and weeds and developing appropriate management strategies to control them.
6. Creates practical awareness about prevalence of weeds in different *Rabi* crops.
7. Familiarize the students about visible field symptoms for the diseases of *Rabi* crops.
8. To develop practical approach in identification of harmful *Rabi* crop insects.
9. Helpful in developing skill among students about calculation of seeds, weedicide, insecticide *etc*. requirement for given practical situations.
10. Helps in developing ability of macro crop related survey and database generation regarding area, production and productivity of crops.

Course Title : Principles of Soil Physics and Conservation
Code : D-493
Class : B. Sc. Ag IV Sem.
Course credit : 2-0-1
Course outcome

1. Develops capacity to understand the forces responsible for weathering and soil formation and its significance for maintenance of life forms on the planet.

2. Helps the students to learn about basic physico-chemical phenomena/processes governing soil fertility and productivity
3. Familiarise the knowledge regarding soil flora and fauna and their role in maintaining hospitability of soil environment for crop plants.
4. Helpful in developing ability among students in understanding transformation of different nutrient elements and the factors affecting these transformations.
5. Familiarise knowledge regarding different forms of soil erosion, factors affecting erosions and strategies to control different forms of soil erosion.
6. Develops practical ability among students in quantification of soil and water loss from an area.
7. Helps in designing and development of soil and water conservation structures and their management.
8. Helpful in acquiring understanding about use of soil survey equipments for efficient land use and planning.
9. Helpful in creating practical ability among students regarding diagnosis of soil problems and developing situation specific plan for their reclamation.
10. Provides opportunity to the students to learn different scientific approaches of soil quality enhancement through visit to different research stations of national repute.

Course Title : Weed Management
Code : D-595
Class : B. Sc. Ag V Sem.
Course credit : 2-0-1

Course outcome

1. Students would able to identify weed species and understand their biological behaviour in reference to crop weed competition.
2. Familiarise the knowledge regarding control and management of weeds on crop lands as well as urban and industrial land scapes.
3. Creates ability among students in designing and development of cost and environment friendly integrated approach for weed management under different crops.
4. To develop skill in students pertaining to scientific approach for evolution and evaluation of chemical weedicides for given set of crop and crop environment.
5. Also enables the students to understand the expected future challenges regarding weed control and management.
6. Helps in practical screening of season and crop wise weed flora.
7. Inculcate practical understanding regarding different weedicidal application equipments, their care and maintenance.
8. To create practical ability in quantification of herbicidal dose for given set of weed control situations.
9. Helps in developing practical skill among students for studding extent of yield loss due to weeds.

10. Develops practical and scientific ability in designing of techniques for estimation of effectiveness of weed control treatments

Course Title : Farming Systems and Sustainable Agriculture
Code : D-694
Class : B. Sc. Ag VI Sem.
Course credit : 2-0-1

Course outcome

1. To familiarise the knowledge in students regarding future format of Agriculture in India and world.
2. To make students familiar about ill consequences of faulty agricultural practices performed during recent pasts and to develop ability to overcome them.
3. To develop a sense and attitude of sustainability among students mind set for achieving food, environment, employment, nutritional and resource security.
4. To develop a comprehensive understanding about agriculture and its allied entrepreneurs as a whole.
5. To create an ability of designing and development of situation specific agri-entrepreneur combination to overcome soil complications, improve farm and national income and to increase employment opportunities.
6. Helps in developing practical understanding regarding socio-economic and climatic factors governing adoption of agri-entrepreneur and a farming system model.
7. To develop an ability among students about to study the practical and economicfeasibility of different agri entrepreneurs in an area.
8. To develop evaluation criteria and parameters for economic comparison of different agri-entrepreneur modules.
9. Helpful in practical designing and evaluation of farming system modules for a given set of agro-ecological situation.

Course Title : Rainfed Agriculture
Code : D-791
Class : B. Sc. Ag VII Sem.
Course credit : 2-0-1

Course outcome

1. The course provides basic idea about trend of land use pattern in the country.
2. Provides knowledge regarding limited availability of irrigation water in India and Indian states and helps in developing an ultimate sense to save water to meet our demand as well as demand of our future generations to come.
3. Familiarise the students about to understand different crop related constraints under dryland, water logged and rain fed situations.
4. Helps in developing situation specific crop management strategies to meet nation's goal of food security and resource sustainability.

5. To develop capability among students for evolution and adoption of contingent crop plans against extremes of weather.
6. Envisages the sense and tendency of watershed based approach among students to cope the problems of soil and water conservation, efficient marketing and rationalized resource utilization.
7. Helps in practical understanding about constraints in crop production observed under drought and water logging prone areas.
8. To develop practical ability for quantification of soil loos, soil moisture retention and determination of bulk and particle density in the soils.
9. Practical development and demonstration of soil and water conservation structures, their maintenance and estimation of construction cost.
10. Creates practical ability among students to determine critical growth stages of crops and the extent of yield loss and gain under shortage of irrigation.

Course Title : Silviculture and Agro-Forestry
Code : D-792
Class : B. Sc. Ag VII Sem.
Course credit : 2-0-1

Course outcome

1. Emphasizes the importance of trees and forestry in meeting farm family multiple needs and conservation and restoration of soils and environment.
2. Familiarises knowledge regarding raising forest nursery, its maintenance and plantation techniques of forests on farm boundaries and social sites.
3. Helps to develop a sense focusing importance of trees described through a sloke in ***Rigveda***

   " **Dus Kup sama Wapi, dus Wapi sama Hadah ,**
   Dus Had Vanshputro, Vansputra sama Taruh" .
4. Helps in developing ability to identify appropriate agroforestry trees under different agro ecological situations.
5. Provides basic understanding regarding rejuvenation of natural forests and rationalized delivery and discharge of services from forests to meet our as well as our future generation's needs.
6. Develops self reliance of entrepreneurship among students through adoption of forest nursery raising and agro-forestry.
7. Practical identification of agroforestry trees and study of their biological behaviour.
8. Creates ability among students for economic analysis and comparison of agro-forestry systems with existing farming systems.
9. Helpful in developing practical skill of cutting, grafting, layring for maintenance and development of desired tree characters.

Course Title : Rural Agricultural Works Experience in Soil And Water Conservation
Code : D-891(h)
Class : B. Sc. Ag VIII Sem.
Course credit : 0-0-2

Course outcome

1. The course provides an opportunity to the students to understanding the rural society in perspective of agriculture and allied activities.
2. Makes the students familiar with socio economic condition and function of farmer and its community.
3. Helps the students to impart the practical knowledge of different irrigation, soil conservation and reclamation operations performed by different farmers.
4. Provides opportunity for the field visit to understand the farmer problems related to declining ground water and gradual loss in soil fertility in reference to crop production and develop strategies for their improvement.
5. Develops confidence and competence among the students in solving agricultural problems.

Course Title : Rural Agricultural Works Experience in Crop Production
Code : D-891(i)
Class : B. Sc. Ag VIII Sem.
Course credit : 0-0-2

Course outcome

1. Helps to understand and quantify the constraints in production of different crop in the college nearby area and also farmer's ongoing efforts and strategic developments required.
2. Makes the students capable to diagnose on farm visible nutrient deficiency symptoms, disease systems, insect infestation and creates ability to manage the problems.
3. Develops communication skill among students in teaching and research using traditional and modern extension tools.
4. Provides opportunity of team work to solve the agricultural problems related to crop production.
5. Develops practical ability in students to understand market related functioning, their lacunas and government and institution supports required.

Department of Ag. Botany
R.K.(PG) College Shamli - 247776
Course outcome

Title: Fundamentals of genetics Ag 102 **3(2+1)**

At the end of Semester the Students will.

1. Understand the significance and historical development of genetics.
2. Awareness of Mendal's law's of heridity and its importance.
3. Explore the linkage and Crossing over in plants, certain point concerning the nature of crossing over, detection of linkage and crossing over and its importance.
4. Know about the Nucleic acids are genetic Materials and Properties of genetic Code.
5. Attain the Knowledge of Structure and synthesis of Nucleic acids.
6. Acquire detail Knowledge of sex linked inheritance, sex influenced and sex limited characters in Human, drosophila and in plants.
7. Get the knowledge of cell-division such as Mitosis and meiosis and gametogenesis in respect to plants and human.
8. Learn about the genes, chromosomes and Structural change in chromosomes in plants.

Title: Elementry crop Physiology - D-293 **3(2+1)**

At the end of Semester the Students will.

1. Understand the role of plant physiology in Agriculture i.e cell structure and its function, diffusion, osmosis, and imbibitions.
2. Learn the roll of essential nutrients, dificiency symptoms and their absorption in plants.
3. Get, how photosynthesis occurs - Light and dark reaction in plants and their importance.
4. Ability to understand the mechanism of respiration, transpiration, Assimilation of Nitrogen, Photoperiodism and Plant growth Substances.

Title: Principles of plant breeding - D-392 **3(2+1)**

At the end of Semester the Students will.

1. Attain Knowledge of History, objectives and Scope of plant breeding.
2. Know the different mode of reproduction in crop plants in relation to breeding technique.
3. Explore the plant variation, its king and causes.
4. Gain Knowledge about male Sterility in plants and its importance.
5. Make outlines of plant breeding programme and Ideal plant types.
6. Understand the different breeding methods in Cross-pollinated crops such as - Introduction, Selection, utilization of hybrid vigour, synthetic and Compostie variety.
7. Know the importance of Polyploidy in plant breeding, Role of Polyploidy in evelaution and in improvement of crops.
8. Acquire detail Knowledge of Mutation such as - gene, Structural and numerical

mutation. Application, Limitation of mutation in plant breeding and its importance.

9. Get about the breeding methods for Asexually propagated crops i.e Clonal Selection, hybridization etc.

Title: Breeding of field crops D-492 3(2+1)

At the end of Semester the Students will.

1. Acquire the Knowledge about origin, distribution and objectives of different field crops in respect of breeding.
2. Learn, what are the breeding problems in field crops in India, their systametic description and economic importance of crops.
3. Know the different methods of breeding, adopted and achievements with reference to cereals, Pulses and oilseeds crops.

Title: Introduction to plant biotechnology D-591 3(2+1)

At the end of Semester the Students will.

1. Understand general knowledge about the scope and importance of plant biotechnology.
2. Learn about the basic concept involved in plant biotechnology/genetic engineering such as respiration of DNA of endonuclease, Electrophoresis of restricted DNA Fragements.
3. Ability to understand the cloning vectors for recombination DNA such as - cauliflower Mosaic virus, Tobacco Mosaic virus.
4. Get acquainted about application of plant genetic engineering in crop improvements.
5. Acquire detail Knowledge about the plant tissue culture such as - Culture media used in plant tissue culture, micropropogation of plants and application of plant tissue culture in crop improvements.

Title: Principles of seed technology-oilseeds and commercial crops D-691 2(1+1)

At the end of Semester the Students will.

1. Learn about the history and importance of seed technology in respect of crop production.
2. Acquire detail knowledge of different classes of seeds, characteristics of quality seeds and its importance.
3. Awareness of general technique of seed production in important agricultural crops such as cereals, pulses, oilseeds and commerical crops.
4. Attain knowledge about the factors affecting seed longevity, quality and causes of seed deterioration with reference to genetic and storage.
5. Get basic principles of seed resting such as importance, procedure, purtiy, viability and germination.
6. Explore the certification procedure for important field crops.

Title Rural Agricultural Work Experience (RAWE) D-891(c) Ag. Botany 1(0+1)

At the end of Semester the Students will.

1. Able to varietals demonstration and visit to crop improvement centres to acquainted with varietal traits and improved varieties.
2. Get the Knowledge about seed organization (Private and Public) in seed production.
3. Understand the seed production and technique of different crops followed crop/ variety wise in the industries.
4. Explore the knowledge of harvest and post harvest, handling of seeds, methods of harvest, threshing, drying, cleaning, grading, storage treatment in the field.
5. Know about the seed testing of different crops in the field.
6. Learn how seeds distribution and marketing process occurs in their respected fields.
7. Acquir detail knowledge about specific problems created related to seed production.

Department of Dairy science and Technology
R.K. (P.G.) College Shamli-247776
Course outcome

Title – Introductory Animal Husbandry – AG-107 3(2+1)

At the end of semester the students will

1. Understand general knowledge about the importance of livestock in agriculture and economy, dairying under specialized and mixed farming and livestock and milk producers statistics
2. Able to apply under dairy cattle and buffalo management –concept of breeding method and system. Care and management of pregnant and milch cow, raising of calves, management related to heifers and bulls. Milking methods principles ,maintenance of different livestock records .Feeds and feeding and conservation of fodder and housing for dairy animals
3. Ability to understand under pig, sheep and goat management- important breeds, breeding, feeding and raising practices.
4. Gain basic knowledge of common animal diseases of cattle, buffalo, goat, sheep and swine.

Title – Milk and milk processing – D-592 3(2+1)

At the end of semester the students will

1. Understand about the milk and its secretion and colostrum.
2. Get acquainted about the micro-organism found in milk and their functions.
3. Awareness of agencies engaged in handling and transportation of milk along with determine the pricing of milk.
4. Learning about various processing of milk like filtration, clarification, bactofugation, homogenization, cooling and chilling etc.
5. Gain knowledge about different heating process of milk like pasteurization, Ultra High Temperature treatment, sterilization etc.
6. Acquiring basic concept of membrane filtration and reverse osmosis process.
7. Idea about common adulterants and preservatives used in milk and their detection.

Title – Dairy products technology – D-692 3(2+1)

At the end of semester the students will

1. Learn about the definition, composition and how to prepare cream, butter, ghee, dahi, chhena, paneer, khoa, condensed milk, milk powder, ice-cream, cheddar and cottage cheese.
2. Acquire knowledge about the common adulterants used in ghee and khoa and their detection through different chemicals tests.
3. Learn about the equipments and utensils, their washing, cleaning and sanitization.
4. Get basic principles and process of refrigeration a cold storage of milk and its products and their utility in dairy industry.
5. Attain knowledge about the nutritive value of milk and milk products in respect of human.

Title – Dairy chemistry and Animal Nutrition – D-795 3(2+1)

At the end of semester the students will

1. Acquire integrate knowledge about milk secretion theories, detailed chemical composition, various depending on the species like cow, buffalo, goat, sheep, camel and human.
2. Learn about colostrum and its chemical composition and difference between milk and colostrum.
3. Ability to understand various physio-chemical properties of milk and their importance in milk adulteration.
4. Know the factors affecting the quantity and quality of milk produced and clean milk production.
5. Explore the bio-chemical changes during storage of milk.
6. Acquire detail knowledge about the chemistry of milk constituents, viz. Lactose, protein, fat, enzymes and vitamins.
7. Get acquainted about the chemical composition of animal body and feeds.
8. Learning about classification of feeding stuffs.

9. Ability to cope up with function of food constituent, their digestion and absorption in ruminants.
10. Have a through understanding about the metabolism of fat, carbohydrate and protein in ruminants.
11. Learn about the role of minerals, hormones, vitamins and antibiotics in animals feeding with special reference to deficiency diseases.

Title – Rural Agriculture Work Experience (RAWE) and Agro- Industrial Attachment (AIA) with Animal Husbandry and Dairying related work – D-891(e) Dairy

At the end of semester the students will

1. Get practical experience of mixed farming system.
2. Attain practical knowledge about the agro based products especially dairy products and learn about the functioning in industry.
3. Acquire basis concept of food processing.
4. Get opportunity to have a close observation of the farmer working in the field

Programme Outcomes of B.Sc. (Ag) Entomology

PO1. Students gain comprehensive knowledge on the evolutionary and ecological relationships of insects with other life forms.

PO2. Analyse complex interactions among the phylum Arthropoda, their distribution and their relationship with the environment.

PO3. Students acquire knowledge on basic concepts of insect morphology, anatomy and physiology.

PO4. Gain knowledge about classification of insects and their taxonomy keys.

PO5. Understands the distribution, life cycle and nature of damage of the pest.

PO6. Understands the integrated pest management and modern techniques of insect control.

PO7. Gain knowledge about beneficial and economic importance insects.

Course Outcomes of B.Sc. (Ag) II sem. (Entomology)

Paper title: FUNDAMENTALS OF ENTOMOLOGY-I **Paper code:** AG-203

CO1. Theory Classification of phylum Arthropoda upto classes. Relationship of class Insecta with other classes of Arthropoda.

CO2. Structure and functions of insect cuticle and moulting. Body segmentation. Structure of Head, thorax and abdomen. Structure and modifications of insect antennae, mouth parts, legs, wing venation, modifications and wing coupling apparatus. Structure of male and female genital organs.

CO3. Metamorphosis and diapausein insects. Types of larvae and pupae. Structure and functions of digestive, circulatory,excretory, respiratory, nervous, secretary (Endocrine) and reproductive systems in insects. Types of reproduction in insects. Major sensory organs like simple and compound eyes and chemorcceptors.

CO4. Taxonomy- importance, history and development and binomialnomenclature. Definitions of Biotype, Sub-species, Species, Genus, Family and Order.

CO5. Classification of class Insecta upto Orders, basic groups of present day insects with special emphasis to orders and families of Agricultural importance like Orthoptera: Acrididae. Dictyoptera: Mantidae, Odonata; Isoptera: Termitidae; Thysanoptera: Thripidae; Hemiptera: Pentatomidae, Coreidae, Cimicidae, Pyrrhocoridae. Lygaeidae, Cicadellidae, Delphacidae, Aphididae, Coccidae, Lophophidae, Aleurodidae, Pseudococcidae; Neuroptera: Chrysopidae; Lepidoptera: Pieridae, Papiloinidae, Noctuidae, Sphingidae, Pyralidae, Gelechiidae, Arctiidae, Saturnidae, Bombycidae; Coleoptera: Coccinellidae, Chrysomelidae, Cerambycidae, Curculionidaee, Bruchidae, Scarabaeidae; Hymenoptera: Tenthridinidae, Apidae. Trichogrammatidae, Ichneumonidae, Braconidae, Chalcididae; Diptera: Cecidomyiidae, Tachinidae, Agromyziidae, Culicidae, Muscidae, Tephritidae.

Course Outcomes of B.Sc. (Ag) III sem. (Entomology)

Paper title: FUNDAMENTALS OF ENTOMOLOGY-II **Paper code:** AG-312

CO1. Insect Ecology: Introduction, Environment and its components. Effect of abiotic factors-temperature, moisture, humidity, rainfall, light, atmospheric pressure and air currents. Effect of biotic factors - food competition, natural and environmental resistance.

CO2. Categories of pests. Concept of IPM, Practices, scope and limitations of IPM. CO2. CO2. CO3. Classification of insecticides, toxicity of insecticides and formulations of insecticides.

Chemical control- importance, hazards and limitations.

CO4. Recent methods of pest control,repellents, antifeedants, hormones. attractants, gamma radiation. Insecticides Act 1968- Important provisions.

CO5. Application techniques of spray fluids. Symptoms of poisoning, first aidand antidotes. Survey, surveillance and forecasting of insect pests. Safety issues of pesticides uses.

Course Outcomes of B.Sc. (Ag) V sem. (Entomology)

Paper title: PESTS OF FIELD CROPS, STORED GRAINS AND THEIR MANAGEMENT **Paper code:** AG-503

CO1. General account on nature and type of damage by following insect pests arthropods pests. Scientific name, order, family, host range, distribution, biology and bionomics. nature of damage, and management of major pests and scientific name, order, family, host range, distribution, nature of damage and control practice other important arthropod pests(mites) of various field crops.

CO2. Factors affecting losses of stored grain and role of physical, biological, mechanical and chemical factors in deterioration of grain. Insect pests, mites, rodents, birds and microorganisms associated with stored grain and their management. Storage structure and methods of grain storage and fundamental principles of grain store management.

CO3. Paddy: *Leptocorisa varicornis, Hieroglyphus Spp., Nilaparvata lugens, Nephotetix spp.,Mythimna separata.* Sorghum and Maize: *Chilo partel1us. Atherigona variasoccata, Scirpophaga excerpatalis. Chilo infuscatelles.* Sugarcane: *Top borer, Pyrilla, Early Shoot borer and white fly*

CO4. Cotton: *Pectinaphora gossypiella. Earias Spp, Sylepta derogata, Dysdercus Spp, Bemisia- tabaci, Amrasca bigutulla bigutulla.* Oilseeds: *Lipaphis erysimi, Athalia proxima, Bagrada cruciferum, Dasyneura lini.* Pulses: *Helicoverpa armigera Agrotis Spp., Etiella zinckenella.*

CO5. Pests of Stored Grains: *Sitophilus oryzae, Trogoderma granarium, Sitotroga cerealella,Callosobruchus chinensis.* Polyphagous pests: *Odontotermes obesus, Holotrichia consanguinea, Spilosoma obliqua,Spodoptera litura.*

Course Outcomes of B.Sc. (Ag) VI sem. (Entomology)

Paper title: BENEFICIAL INSECTS and PESTS OF HORTICULTURAL CROPSAND THEIR MANAGEMENT **Paper code:** AG-608

CO1. Types of silkworm, voltinism and biology of silkworm. Mulberry cultivation, mulberry varieties, methods of harvesting and preservation of leaves. Rearing of mulberry silkworm, rearing appliances, mounting and harvesting of cocoons. Pests and diseases of silkworm, management, and methods of disinfection.

CO2. Importance of beneficial insects. bee keeping, pollinating plants and their cycle, bee biology, commercial methods of rearing, equipment used and seasonal management. Bee pasturage. bee foraging and communication. Insect pests and diseases of honey bee.

CO3. Species of lac insect, morphology, biology. host plant and lac production- Processing of lac - seed lac, button lac. shellac and lac- products. Identification of major parasitoids and predators commonly used in biological control.

RK (PG) College, Shamli-247776

Department of Horticulture

Course Outcome

Course- I (AG-104) Fundamental of Horticulture

1- Develop skill of Plant propagation methods and plant propagation structures.

2- Knowledge of orchard establishment.

3- Method of training and pruning of fruit crops.

4- Uses of plant growth regulators in Horticulture.

5- Identification of horticultural crops.

Course- II (AG-207) Production technology for vegetable and spices

1- Importance of vegetables and spices in human nutrition and National economy.

2- Types of vegetable gardening.

3- Cultivation method of important vegetables and spices.

4. Weed management in vegetable production.

5- Insect pest and disease management of vegetable and spices.

6. Raising technique of nursery of vegetable and spices.

7. Economics of vegetables and spices cultivation.

Course- III (AG-407) Production technology of ornamental crops

1- Importance and scape of ornamental crops medicinal and aromatic plant.

2- Style of gardening and lawn making and maintenance.

3- Production technology of importance cut flowers like- Rose, Gerbera, Carnation Marigold, Chrysanthemum, Gladiolus and Tuberose.

4- Production technology of medicinal plants like- Isabgol, Ashwagandha, Aspergas, Aloe citronella, Mint, Geranium.

5- Identification of ornamental crops and medicinal crops.

6- Extraction of essentials oil from ornamental flowers.

Course- IV (AG-507) Production technology of fruit and plantation crops

1- Importance of Fruits in human diet and importance and scape of fruit and plantation crop industry in India.

2- Cultivation of major fruit crops like- Mango, Banana, Citrus, Grape, Guava, Litchi, Papaya, Apple, Pear and Peach etc.

3- Cultivation of plantation crop like- Tea, Coffee, Rubber, Coconut, Cashews etc.

4- Propagation method and system of planting for fruit and plantation crops.

5- Uses of plant growth harmones in fruit production.

6- Pant protection technique against pest diseases and physiological disorders.

Course- V (AG-606) Past harvest management and value addition of fruits and vegetables

1- Importance of post-harvest technology of fruit and vegetables.

2- Principles and method of fruit and vegetable preservation

3- Canning concept and standards, packaging of products.

4- Preparation method of Jam, Jelly, Marmalade, Preserve, Candy, Tomato sauce, squashes.

5- Uses of house hold preservatives and chemical preservatives in fruit and vegetable preservation.

6- Application of different type of packaging containers for self-life extension.

7- Technical skill development.

8- Self-employment generation.

B.Sc. (Ag) 2nd Semester, Course – I (D-296): Introductory Plant Pathology

After completing this course the students will be able to understand and explain:

- Definition and importance of plant pathology
- Causes of plant diseases
- Classification of plant diseases according to cause and occurrence

Detail study of following Plant Pathogens:

(a) Fungi

- Economic importance and general characteristics
- Morphology of different vegetative structures (thallus, mycelium, haustoria etc.)
- Reproduction
- Different types of spores.
- Levels of parasitism

Nomenclature & Classification of fungi with special reference to genera listed under following item:

- **Life histories of:** *Pythium*, *Albugo*, *Erysiphe*, *Ustilago*, *Claviceps* and *Puccinia*.
- **Diagnostic characters of the following genera**: *Phytophthora*, *Peronospora*, *Sclerospora*, *Ustilago*, *Sphacelotheca*, *Tolyposporium*, *Melampsora*, *Alternaria*, *Cerospora*, *Fusarium*, *Helminthosporium*, *Pyricularia*, *Rhizoctonia*, *Colletotrichum*.

(b) Bacteria:

- Brief history of bacteria as plant pathogens
- Morphology and Cell structure
- Vegetative reproduction
- Brief outline of classification of plant pathogenic bacteria
- **A brief account of mycoplasma**.

(c) Viruses

- Nature and properties
- Transmission of plant virus

(d) Phanerogamic parasites*:* *Cuscuta*, *Loranthus*, *Orobanche* and *Striga*

B.Sc. (Ag) 5th Semester, Course – II (D-596): Crop Diseases and Their Management

After completing this course the students will be able to understand and explain:

- General Symptoms of plant diseases
- Methods of plant disease management.
- Preliminary knowledge of different groups of fungicides.
- **The symptoms, etiology, mode of perpetuation and management of the following diseases:**
    - ♦ Early and late blight of potato.
    - ♦ White rust of crucifers.
    - ♦ Green ear disease of bajra.
    - ♦ Loose smut, Karnal bunt of wheat
    - ♦ Rusts of wheat.
    - ♦ Covered smut of barley.
    - ♦ Grain smut of Jowar
    - ♦ Bajra smut
    - ♦ Rust of linseed
    - ♦ Leaf spot or Tikka disease of groundnut

- Wilt of arhar
- Stripe disease of barley
- Red rot of sugarcane
- Blast of rice.
- Citrus canker
- Khaira disease of paddy
- Black tip of mango.
- Tobacco mosaic
- Yellow vein mosaic of bhindi
- Bean common mosaic
- Little leaf of brinjal

B.Sc. (Ag) 6th Semester, Course – III (D-696): Mushroom Cultivation

After completing this course the students will be able to understand:

- Morphology of edible mushrooms and their classification.
- Spawn and its preparation.
- Types of Spawn: Mother spawn and Commercial spawn
- Methods of Cultivation of different types of edible mushrooms
- Mushroom Diseases and their management
- Mushroom recipes

B.Sc. (Ag) 8th Semester, Course – IV : D-891 (J) - Rural Agricultural Work Experience (RAWE)
Plant Pathology

- Students have to be exposed to rural (Village) environment for strengthening practical training -group of students have been associated to farmers, agro-industrial units and agricultural research station for this purpose for a period of 3-4 months. They will be constantly supervised and evaluated by the faculty and a detailed report of the survey and works of the students for the period is to be submitted by him/her.